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[54] **SYSTEM AND METHOD FOR DETERMINING THE POSITION OF A WIRELESS CDMA TRANSCEIVER**

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[58] **Field of Search** 342/357.01, 357.05, 342/357.06, 357.09, 357.1, 357.16; 701/213

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[57] **ABSTRACT**

A system and method for determining a position of a mobile wireless transceiver. The inventive system merges GPS position location and wireless communication technologies to achieve a precise position location in dense urban and other environments when line-of-sight to the satellites is somewhat obscured. The inventive method uses signals from only two GPS satellites and the serving terrestrial base station. In a most general sense, the inventive method includes the steps of receiving at a base station a first signal transmitted from a first GPS satellite and a second signal transmitted from a second GPS satellite. The mobile transceiver is adapted to receive these GPS signals as well and transmit a third signal to the base station in response thereto. The base station receives the third signal and uses it to calculate the position of the wireless unit. In a specific implementation, the base station sends aiding information to the wireless unit. The aiding information is used by the wireless unit to quickly acquire the signals transmitted by the first and second satellites and includes satellite identification information, Doppler shift information, and range information between the base station and the satellites. On the acquisition by the wireless unit of the signals transmitted by the first and second satellites, the wireless unit wireless unit calculates the range between the wireless unit and each of the satellites. This range information is transmitted back to the base station along with information as to the time at which the measurement was made. In a CDMA implementation, the time at which the wireless unit transmits the third signal to the base station is known by the base station. The delay in the receipt of the third signal provides an indication to the base station as to the range between the base station and the wireless unit. The base station utilizes information known as to its position, the position of the first and second satellites relative to the wireless unit and the range to the wireless unit from the base station to calculate the position of the wireless unit.

21 Claims, 8 Drawing Sheets